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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/686,784	10/10/2000	Miguel Philipe Paul Peeters	1875.5450000	4881

26111 7590 04/04/2007

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EXAMINER	
WANG, TED M	
ART UNIT	**PAPER NUMBER**
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

SK

Office Action Summary	Application No.	Applicant(s)	
	09/686,784	PEETERS, MIGUEL PHILIPE PAUL	
	Examiner	Art Unit	
	Ted M. Wang	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-20* is/are rejected.

7)☒ Claim(s) *4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 Jan. 2007 has been entered.

Response to Arguments

2. Applicant's arguments, filed on 1/16/2007, with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1-3, 5, 10-12, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al. (US 6,654,431) in view of Smith (US 5,365,470) and Hasegawa et al. (US 6,735,244) and Tanabe et al. (US 6,714,529).

- In regard claim 1, Barton et al. discloses a multimode digital modem for demodulating a multi-tone, multi-band signal using an inverse discrete Fourier transform or inverse fast Fourier transform (Fig.3 element 340) to generate a signal having plurality of tones spaced in frequency in a plurality of frequency bands (Fig.3), comprising

a plurality of demodulators (Fig.10 elements 410/411 (filter), 420/421 (converter), 430/431 (DFT), 440/441 (equalizer), where the disclosure of the instant application, as recited in page 2 lines 2-21 and Fig.3 and 4, discloses a demodulator comprising filter 302/310, DFT 244, and equalizer 248a) is configured to demodulate a different one of the plurality of frequency bands of the multi-tone, multi-band signal (column 14 lines 1-14. Since receiver 400 is configured for the general case of detecting the over-the-air transmission from transmitter 300 via plurality of processing paths for "diversity reception", that is, each receiver 400 may be arranged with a plurality of receiving paths 401, . . . , 402 (e.g., receiving antennas) to detect the propagating RF signal from transmitter 300, it is inherent that Barton's receiver is capable of demodulating a different one of the plurality of frequency bands of the multi-tone, multi-band signal.), and

wherein each demodulator includes a discrete Fourier transform module (Fig.10 element 430) that performs a discrete Fourier transform; and

wherein the plurality of demodulators are configurated to perform demodulation in parallel (Fig.10 element 400 and column 14 lines 1-14).

Barton et al. discloses all of subject matter as described in the above paragraph except for specifically teaching (a) each of the plurality of demodulators is configured to utilize a different sampling rate, and at least two of the plurality of demodulator have different discrete Fourier transform sizes; (b) each demodulator includes a time equalizer coupled to the input of the discrete Fourier transform module, and (c) at least one of the plurality of demodulators receives a downsampled data

However, Smith teaches a receiver comprises (a) a plurality of demodulators (Fig.6 and column 6 lines 58-68), each of the plurality of demodulators is configured to utilize a different sampling rate (Fig.1 elements 10, Fig.6 element 178 outputs, column 6 lines 46-50 and column 6 line 61 – column 7 line 3), and at least two of the plurality of demodulator have different discrete Fourier transform sizes (Fig.1 elements 10, Fig.6 element 178 outputs, and column 6 line 20 – column 7 line 3). Smith teaches a receiver 150 connected to the antenna 148 processes the received signal and transmits it to an Analog to Digital converter 160 which transmits a digitized signal to a window presum 162. The window presum 162 **reduces the frequency range to specific bands for sampling**. In Fig.6, there are different DFT sizes or points (N, N/8, N/2, N/16, ...etc.) generated at window presum output. It is inherent that each of the plurality of demodulators is configured to utilize a different sampling rate.

It is desirable to have a receiver comprising a plurality of demodulators, wherein each of the plurality of demodulators is configured to utilize a different sampling rate, and at least two of the plurality of demodulator have different discrete Fourier transform sizes in order to simultaneous process different size FFTs to allows efficient sharing of processing elements and reduces overall hardware requirements (abstract lines 13-16). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the N-point DFT 430/431 of Barton's demodulation circuit to include the window presume and FFTMP circuit as taught by Smith so as to simultaneous process different size FFTs to allows efficient sharing of processing elements and reduces overall hardware requirements so that the system cost is reduced.

Barton et al. and Smith disclose all of subject matter as described in the above paragraph except for specifically teaching (b) each demodulator includes a time equalizer coupled to the input of the discrete Fourier transform module, (c) at least one of the plurality of demodulators receives a downsampled data

However, Hasegawa et al. teaches (b) each demodulator (Fig.14 elements 90, 100, 110, 120) includes a time equalizer (Fig.14 element 90) coupled to the input of the discrete Fourier transform module (Fig.14 element 110) in order to reduce the intersymbol interference (column 5 lines 15-17) so that the receiving quality can be improved. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to

include a TEQ circuit as taught by Hasegawa et al. between receiver (401/411) and serial-parallel converter (420/421) of the modified Barton and Smiths' demodulation circuit so as to reduce the intersymbol interference so that the receiving quality can be improved.

Barton et al. and Smith and Hasegawa et al. disclose all of subject matter as described in the above paragraph except for specifically teaching (c) at least one of the plurality of demodulators receives a downsampled data.

However, Tanabe et al. teaches (c) at least one of the plurality of demodulators receives a downsampled data (Fig.20 elements 2071, 2072 outputs, column 6 line 46 – column 7 line 8, and where the downsampled data is outputted from the downsampler, 2053 and 2054) in order to reduce the number of demodulation circuits required by processing a plurality of different low speed signals, compared with the device that used a constant speed demodulation circuitry (column 29 lines 19-23). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include a 2-demultiplexing filter bank circuit with downsampler as taught by Tanabe et al. and connect its outputs to the inputs (400, 401) of the modified Barton et al. and Smith and Hasegawas' demodulator circuitry so as to reduce the number of demodulation circuits required by processing a plurality of different low speed signals, compared with the device that used a constant speed demodulation circuitry.

- In regard claim 2, all limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.

- In regard claim 3, Barton et al. further discloses that each demodulator further includes an equalizer connected to the output of the discrete Fourier transform in Fig.10 elements 440 and 441 and column 14 lines 42-58.
- In regard claim 5, Barton et al. further discloses that a transceiver including a receiver (Fig. 3 and Fig.10, and column 6 lines 57-58).
- In regard claim 10, Barton et al. further discloses that the multi-band signal is generated by filtering the output of the modulator (Fig.3 element 380).
- In regard claim 11, which is a method claim related to claim 1. All limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- In regard claim 12, which is a method claim related to claim 3. All limitation is contained in claims 3. The explanation of all the limitation is already addressed in the above paragraph.
- In regard claim 14, which is a method claim related to claim 5. All limitation is contained in claims 5. The explanation of all the limitation is already addressed in the above paragraph.
- In regard claim 17, which is a method claim related to claim 10. All limitation is contained in claims 10. The explanation of all the limitation is already addressed in the above paragraph.

5. Claims 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al. (US 6,654,431) and Smith (US 5,365,470) and Hasegawa et al. (US

6,735,244) and Tanabe et al. (US 6,714,529) as applied above to claim 1, and further in view of Allpress et al. (US 6,496,546).

- In regard claim 13, Barton et al., Smith, Hasegawa et al. and Tanabe et al. disclose all subject matter as described in the above paragraph except for specifically teaching that wherein each demodulator further includes a filter for filtering the received signal prior to the discrete Fourier transform.

  However, Allpress et al. teaches wherein each demodulator further includes a filter for filtering the received signal prior to the discrete Fourier transform (Fig.6A element FIR filter and FILTER 1– FILTER N).

  It is desirable that wherein each demodulator further includes a filter for filtering the received signal prior to the discrete Fourier transform in order to improve the noise and design complexity so that the communication quality is improved and system cost is reduced. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Allpress et al. in which, wherein each demodulator further includes a filter for filtering the received signal prior to the discrete Fourier transform, into Barton et al., Smith, Hasegawa et al. and Tanabes' modified receiver so as to improve the noise and design complexity so that the communication quality is improved and system cost is reduced.

6. Claim 6-8, and 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al. (US 6,654,431) and Smith (US 5,365,470) and Hasegawa et al. (US

6,735,244) and Tanabe et al. (US 6,714,529) as applied above to claim 5, and further in view of Ho et al. (US 5,317,596).

- In regard claim 6, Barton et al., Smith, Hasegawa et al. and Tanabe et al. disclose all subject matter as described in the above paragraph except for specifically teaching that each demodulator includes an echo canceller for removing an echo associated with a signal in a transmitter of the transceiver from the received signal.

  However, Ho et al. teaches that each demodulator includes an echo canceller for removing an echo associated with a signal in a transmitter of the transceiver from the received signal (Fig.3 element 100 and column 5 line 26 – column 6 line 25).

  It is desirable that each demodulator includes an echo canceller for removing an echo associated with a signal in a transmitter of the transceiver from the received signal in order to cancel the interference (column 5 line 26 – column 6 line 25) so that the communication quality is improved. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Ho et al. in which, each demodulator includes an echo canceller for removing an echo associated with a signal in a transmitter of the transceiver from the received signal, into Barton et al., Smith, Hasegawa et al. and Tanabes' modified receiver so as to cancel the interference so that the communication quality is improved.

- In regard claim 7, Barton et al. and Smith disclose all subject matter as described in the above paragraph except for specifically teaching that echo canceller is connected to remove the echo at the input to the discrete Fourier transform.

  However, Ho et al. teaches that the echo canceller is connected to remove the echo at the input to the discrete Fourier transform (Fig.3 elements 100 and 56 and column 5 line 26 – column 6 line 25).

  It is desirable that echo canceller is connected to remove the echo at the input to the discrete Fourier transform in order to provide an improved echo canceller that accurately estimates and eliminates unwanted echo present in full-duplex data communication channels (column 4 lines 3-6) so that the communication quality is improved. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Ho et al. in which, echo canceller is connected to remove the echo at the input to the discrete Fourier transform, into Barton et al. and Smiths' demodulation circuit so as to eliminates unwanted echo present in full-duplex data communication channels so that the communication quality is improved.

- In regard claim 8, Barton et al., Smith, Hasegawa et al. and Tanabe et al. disclose all subject matter as described in the above paragraph except for specifically teaching that each echo canceller comprises an adaptive filter.

  However, Ho et al. teaches that each echo canceller comprises an adaptive filter (column 6 line 50 – column 7 line 4).

It is desirable that each echo canceller comprises an adaptive filter in order to improve the echo cancellation performance (column 7 lines 1-4) so that the communication quality is improved. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Ho et al. in which, each echo canceller comprises an adaptive filter, into Barton et al., Smith, Hasegawa et al. and Tanabes' modified demodulation circuit so as to improve the echo cancellation performance so that the communication quality is improved.

- In regard claim 15, which is a method claim related to claim 6. All limitation is contained in claims 6. The explanation of all the limitation is already addressed in the above paragraph.

7. Claims 9 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al. (US 6,654,431) and Smith (US 5,365,470) and Hasegawa et al. (US 6,735,244) and Tanabe et al. (US 6,714,529) as applied above to claims 1 and further in view of Agee (US 6,128,276).

- In regard claims 9 and 16, Barton et al., Smith, Hasegawa et al. and Tanabe et al. disclose all subject matter as described in the above paragraph except for specifically teaching that the signal is generated by nulling selected tones in the modulator.

However, Agee teaches that the signal is generated by nulling selected tones in the modulator (column 6 line 5-17 and column 9 lines 49-59).

It is desirable that that the signal is generated by nulling selected tones in the modulator to eliminate out-of-cell interference (column 5 lines 1-14). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Agee in which, the signal is generated by nulling selected tones in the modulator, into Barton et al., Smith, Hasegawa et al. and Tanabe modulator circuit so as to eliminate out-of-cell interference.

8. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al. (US 6,654,431) and Smith (US 5,365,470) and Hasegawa et al. (US 6,735,244) and Tanabe et al. (US 6,714,529) as applied above to claims 1, and further in view of Liu et al. (US 6,442,195).

- In regard claim 18, Barton et al., Smith, Hasegawa et al. and Tanabe et al. disclose all subject matter as described in the above paragraph except for specifically teaching that the receiver comprises a splitter wherein the splitter communicates each of the plurality of data signals to one of the plurality of demodulators.

  However, Liu et al. teaches the receiver comprises a splitter (Fig.2 element 210 and column 6 lines 32-50), wherein the splitter communicates each of the plurality of data signals to one of the plurality of demodulators (Fig.2 element 295, column 6 line 51 – column 7 line 5, and Fig.3 and column 7 line 55 – column 8 line 4).

It is desirable that the receiver comprises a splitter wherein the splitter communicates each of the plurality of data signals to one of the plurality of demodulators in order to improve the frequency band selecting ability so that the communication quality is improved. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Liu et al. in which, that the receiver comprises a splitter wherein the splitter communicates each of the plurality of data signals to one of the plurality of demodulators, into Barton et al., Smith, Hasegawa et al. and Tanabe's modified demodulation circuit so as to improve the frequency band selecting ability so that the communication quality is improved.

9. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al. (US 6,654,431) and Smith (US 5,365,470) and Hasegawa et al. (US 6,735,244) and Tanabe et al. (US 6,714,529) as applied above to claims 1, and further in view of Kahre (US 5,680,388).

- In regard claims 19 and 20, Barton et al., Smith, Hasegawa et al. and Tanabe et al. disclose all subject matter as described in the above paragraph except for specifically teaching that the discrete Fourier transform module performs a discrete Fourier transform at sampling frequency (Fs, k) wherein the sampling frequency (Fs, k) is associated with the frequency band of the demodulator, and wherein the sampling frequency is at least double the maximum frequency of the frequency band of the demodulator.

However, Kahre teaches that the discrete Fourier transform module performs a discrete Fourier transform (Fig.2 element S) at sampling frequency (Fs, k) wherein the sampling frequency (Fs, k) is associated with the frequency band of the demodulator (Fig.2 element U, and column 4 lines 23-40); and wherein the sampling frequency is at least double the maximum frequency of the frequency band of the demodulator (column 4 lines 22-40).

It is desirable that the discrete Fourier transform module performs a discrete Fourier transform at sampling frequency (Fs, k) wherein the sampling frequency (Fs, k) is associated with the frequency band of the demodulator and wherein the sampling frequency is at least double the maximum frequency of the frequency band of the demodulator in order to improve the synchronization (column 4 lines 23-40) and data recovery so that the communication performance can be improved. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Kahre in which the discrete Fourier transform module performs a discrete Fourier transform at sampling frequency (Fs, k) wherein the sampling frequency (Fs, k) is associated with the frequency band of the demodulator and wherein the sampling frequency is at least double the maximum frequency of the frequency band of the demodulator, into Barton et al., Smith, Hasegawa et al. and Tanabes' modified receiver so as to improve the synchronization.

Allowable Subject Matter

10. Claim 4 is objected to as being dependent upon an objected claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M. Wang whose telephone number is 571-272-3053. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ted M Wang
Examiner
Art Unit 2611

Ted M. Wang